CLAIMS

1. Method for etching phosphate ore, comprising:

- a digestion of phosphate ore by an aqueous solution of hydrochloric acid, which results in formation of an etching liquor consisting of an aqueous phase, in which calcium phosphate is in solution, and an insoluble solid phase which contains impurities,
- a first separation between the insoluble solid phase and the aqueous phase of the etching liquor,
- a preliminary neutralization of an aqueous medium containing calcium phosphate in solution to a first pH which is lower than the pH at which a significant part of this calcium phosphate in solution precipitates in the form of calcium monohydrogen phosphate (DCP), with precipitation of impurities,
- an isolation of the precipitated impurities from the pre-neutralized aqueous medium,
- a subsequent neutralization of said pre-neutralized aqueous medium to a second pH which is greater than the aforementioned first pH, with precipitation of DCP, and
- a second separation between the subsequently neutralized aqueous medium, which is an aqueous solution of calcium chloride, and the precipitated DCP,

characterized in that it comprises a digestion, in one step and in co-current, of phosphate ore having a P2O5 content of more than 20% by weight by an aqueous solution of hydrochloric acid having an HCl concentration of less than 10% by weight, and in that, in order to reach said first pH, said preliminary neutralization is carried out before said first separation in said etching liquor as aqueous medium containing calcium phosphate in solution, the isolation of the precipitated impurities taking place during said first separation of said insoluble solid phase, and said aqueous medium which has been pre-neutralized and subjected to said subsequent neutralization being formed of the separated aqueous phase resulting from the first separation.

2. Method according to Claim 1, characterized in that said first pH of the etching liquor is adjusted by said preliminary neutralization to a value between 0.8 and 4, preferably between 1.3 and 1.5.

3. Method according to either of Claims 1 and 2, characterized in that said second pH of said separated aqueous phase resulting from the first separation is adjusted by said subsequent neutralization to a value of at least 4.5, preferably at least 5.

4. Method according to any one of Claims 1 to 3, characterized in that said preliminary and subsequent neutralizations are carried out using a strong base selected from the group consisting of the hydroxide, the oxide and the water-soluble salts of calcium, sodium, potassium and/or ammonium.

5. Method according to any one of Claims 1 to 4, characterized in that the digestion is carried out at ambient temperature.

6. Method according to any one of Claims 1 to 5, characterized in that it comprises a preliminary step of forming said aqueous solution of hydrochloric acid by diluting concentrated hydrochloric acid in water.

7. Method according to any one of Claims 1 to 6, characterized in that it comprises a preliminary step of forming said aqueous solution of hydrochloric acid by treating an aqueous solution of calcium chloride with sulphuric acid and removing a calcium sulphate precipitate therefrom.

8. Method according to any one of Claims 1 to 7, characterized in that the phosphate ore has a P2O5 content of 25 to 35% by weight.

9. Method according to any one of Claims 1 to 8, characterized in that said aqueous solution of hydrochloric acid which is used in the digestion has an HCl concentration of around 3 to 8%, preferably 5 to 7.4% by weight.

10. Method according to any one of Claims 1 to 9, characterized in that it comprises a treatment of said aqueous solution of calcium chloride with an aqueous solution of sulphuric acid, with formation of insoluble calcium sulphate, which precipitates, and of an aqueous phase based on hydrochloric acid, an isolation of the calcium sulphate precipitate, and an at least partial recycling, to the digestion step, of the aqueous phase based on hydrochloric acid, so as to form said aqueous solution of hydrochloric acid.

11. Method according to any one of Claims 1 to 9, characterized in that it also comprises an additional neutralization of said aqueous solution of calcium chloride, so as to adjust this aqueous solution to a pH which is greater than the pH of the subsequent neutralization and so as to precipitate residual impurities, and an elimination of these impurities from said aqueous solution, a treatment of the latter with an aqueous solution of sulphuric acid, with formation of insoluble calcium sulphate, which precipitates, and of an aqueous phase based on hydrochloric acid, an isolation of the calcium sulphate precipitate, and a recycling, to the digestion step, of the aqueous phase based on hydrochloric acid, so as to form said aqueous solution of hydrochloric acid.

12. Method according to Claim 11, characterized in that the pH of said aqueous solution of calcium chloride is adjusted by said additional neutralization to a value of at least 8.5, preferably at least 9.

13. Method according to either one of Claims 11 and 12, characterized in that the additional neutralization is carried out using a strong base selected from the group consisting of the hydroxide, the oxide and the water-soluble salts of calcium, sodium, potassium and/or ammonium.

14. Method according to any one of Claims 1 to 13, characterized in that the digestion takes place in a reactor equipped with a stirrer.